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Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as 'Adulterations, English food', 'Aeronautics, progress of', 'Answers to correspondents', etc., with corresponding page numbers.

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Vol. II., No. 49.

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TABLE OF CONTENTS.

(With 49 Engravings.)

Table listing supplement articles such as 'I. THE INTERNATIONAL EXHIBITION OF 1876', 'II. ENGINEERING AND MECHANICS', 'III. TECHNOLOGY', etc.

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PROSPECTS OF AERONAUTICS.

Though failure more or less signal and complete has been the fate of every attempt thus far made to navigate the air by mechanical devices, the problem has by no means been given up as hopeless. Better still, sufficient progress has been made of late toward a right understanding of the conditions and requirements of flight to justify the belief that the obstacles to be overcome are purely mechanical, and sure, sooner or later, to be successfully surmounted.

The problems to be solved before aerial navigation takes its place among human achievements are consequently these two—the invention of an apparatus to accomplish the work of the bird's wings and tail, and an engine capable of developing great power with comparatively little weight of machinery and fuel.

It is quite possible that aerial rafts, supported by balloons, may sometimes be useful in regions favored with winds which blow steadily in a fixed direction for months at a time; but in ordinary climates, they cannot but be as useless for commercial purposes as log rafts in a sea everywhere as vexed by conflicting currents as Hell Gate was in its worst days.

After many experiments and no small amount of costly investigation, the Aeronautical Society of Great Britain, so long presided over by the Duke of Argyll, has pronounced decisively against the balloon as incapable of being made useful for the purpose of locomotion, except in the way of waftage; and in a recent report, the secretary of the society declares that the sole improvement of which the balloon is

capable is the invention of some means to secure its ascent and descent without the expenditure of gas or ballast.

Suppose we have, for example, a balloon so weighted that it would float on the discharge of 35 lbs. of ballast, or on receiving an additional thousand cubic feet of gas. It is plain that, if some mechanical means (say a screw acting vertically) were added, capable of exerting a lifting force of 35 lbs. more than its own weight—a light two horse power would drive it—the voyager would be able to rise without discharging ballast, or sink without discharging gas; and so be able to avoid obstacles while drifting over the surface, or to rise above adverse currents to such as might be more favorable.

But for the purposes of real aerial navigation, such drifting is wholly inadequate. The work to be accomplished is not the floating of a relatively light body in more or less favorable air currents, but the propulsion of a heavy body with a force sufficient to overcome all aerial resistance, and with velocity enough to make the inevitable driftage relatively unimportant.

This has not yet been achieved, though the efforts toward it have shown some very encouraging results. Certain experiments made at the expense of the Aeronautical Society, to determine the exact lifting pressure of air currents against a plane inclined at different angles, obtained results which are especially promising. The plane used was a steel plate a foot square, and the substitute for wind or the resistance, occasioned by the passage of a body at high speed through the air, was the blast of a powerful fan blower. Placed at right angles to this blast, the pressure on the plate was 3 1/2 lbs., indicating a wind velocity of about twenty-five miles an hour. Inclined at an angle of 15°, the plate received a direct pressure of only one third of a pound, while the lifting pressure amounted to 1 1/2 lbs. In other words, a plane of 1 square foot, held at an angle of 15° against a current of air having the velocity of twenty-five miles an hour, will carry four times as much weight as it meets resistance. A less angle than 15° could not be tried, owing to some obstruction to the action of the apparatus. The experiments showed, however, that the ratio of the lift to the thrust greatly increased as the inclination of the plane diminished, and also that the lifting power of the current, per square foot of plane, increased with the extension of the sustaining surface, probably on the same principle that makes a large sail on a ship so much more efficient than an equal area of small sails.

The chief thing that remains to be done for the successful solution of the problem of flight is therefore this: To drive a sufficiently broad-bottomed car, say from forty to sixty miles an hour, by means of apparatus acting on the air. With this velocity the resistance of the air would support the car, at the cost of a relatively small part of the driving force. A number of experiments have been made in this direction, perhaps the nearest to success being one in which a small engine drove a plane, carrying, with its weight, a load of 214 lbs. around a circular course (planked) at the rate of twelve miles an hour, by means of two wheels working in air and having a driving surface of 60 square feet. A speed three times as great would have been required to lift the apparatus from the ground.

Other experiments have shown that, by direct acting vertical screws, a constant force of three horse power will support 100 lbs.; and inasmuch as a one horse power engine has been made weighing no more than 13 lbs., the possibility of an engine's lifting itself in that way is clear. In another experiment made to ascertain what lifting power could be got from planes moving in horizontal orbits, an engine weighing 186 lbs. was prove capable, under very unfavorable conditions, of lifting itself with 40 lbs. additional weight.

If the results obtained by the fan blast and inclined plane are to be depended on, an engine used for propulsion ought to succeed even better than those employed direct in lifting.

ENGLISH DEALINGS WITH FOOD ADULTERATIONS.

If there is any one subject on which the British public is extremely sensitive, it is the quality and purity of its food and drink. No country, we believe, has such stringent legislative enactments against adulterations; and the legal formalities for their enforcement are made so few and simple that the aggrieved consumers now waste no time in vain denunciations, but summon the offending grocer or butterman forthwith before the nearest magistrate to answer for the fraud.

An excellent instance, showing how persistently warfare against spurious materials is waged, is found in attacks now being made in England on artificial butter. It is a well known fact that, until recently, attempts to produce even a moderately palatable artificial butter have failed; and although the product has been made of fair savor while fresh, a day or two's keeping has turned it into mere tallow. In England, however, the fraud has not ended at this. Conscienceless individuals have sold as butter, it is said, horrible concoctions of old lubricating tallow, and even old tallow candles minus the wicks, which an official analyst describes as "supplied to the poor in the last stages of rottenness." One factory was detected making this delectable product at the rate of two tons a day. This and many other like cases being well known, it is but natural that the British public should cordially detest "grease butter." The London Grocer has lately printed long reports of trials of sellers of the adulterated material; and to show how rigidly the penalties against the adulterations are enforced, we note that a retailer who purchased grease butter, innocently supposing it to be genuine cream butter, and who sold it to a customer as